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SUMMARY

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THE FERTILIZER INDUSTRY IN THE U.A.R.: FACTORS DETERMINING THE CHOICE OF RAW MATERIALS AND PROCESSES

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D.11

THE FERTILIZER INDUSTRY IN THE U.A.R.

Factors Determining the Choice of Raw Materials and Processes

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(S u m m a r y)

Agriculture in the U.A.R. is dependent on relatively heavy use of fertilizer to maintain crop yields. Before the 1952 revolution most of our requirments of nitrogen fertilizers were imported. The implementation of the projects of the first five-year industrial plan raised our productive capacity of nitrogen fertilizers from 200,000 metric tons per year (15.5%N) to 1,035,000 tons per year, and of superphosphate from 100,000 tons to 190,000 tons per year. The projects of the first-five year industrial plan included the extension of the already existing two superphosphate plants, and the Suez nitrogen fertilizer plant, and the erection of a new plant at Aswan. The latter produces calcium ammonium nitrate (20.5%N) with a daily capacity of about 1600 tons.

However, the consumption of fertilizers was steadily increasing and in drawing up the first over-all five-year economic plan of the country (1960-1965), it was estimated that by 1965 the country's annual need of fertilizers would amount to two million tons of nitrogen fertilizers (15.5%N), and 580,000 tons of superphosphate. To satisfy these needs, the second five-year industrial plan which was incorporated in the over-all first five-year economic plan, included several new projects of fertilizer production. These are: (a)further extension of the Suez plant to produce an additional 460,000 tons per year (based on 15.5%N) of calcium nitrate and calcium ammonium nitrate; (b)the erection of a new plant at Helwan near Cairo to produce yearly about 520,000 tons of calcium ammonium nitrate and urea (15.5%N); (c)the erection of a new plant in Alexandria to produce 200,000 tons per year of calcium nitrate; (d)the erection of a new superphosphate plant at Asyut with an annual capacity of 200,000 tons; (e) the extension of the already existing two superphosphate plants by doubling their capacities and bringing these up to 240,000 tons and 140,000 tons of superphosphate per year respectively.

The raw materials for the superphosphate manufacture are, rock phosphate mined in the Nile valley at Sebaiya, and sulphuric acid. The sulphuric acid was manufactured in the old plants from imported pyrite, whereas the new extensions and new plants will use elemental sulphur since the capital investment is less than when pyrite is used. Furthermore 30,000 tons of petroleum sulphur will be available locally from the Suez petroleum coking plant.

The raw materials for the manufacture of nitrogen fertilizers are varied, depending on the locality of the plant.

(a) The Suez plant employs now a process of reforming refinery gases to produce synthesis gas. However, this system has caused a lot of trouble due to the frequent corrosion of the expensive stainless steel tubes of the reforming furnace. It has been decided to replace the reforming process by a partial oxidation process to save about 18% of the running cost per hour of the ammonia plant. In the Suez plant, the nitric acid was always produced by a pressure-pressure system. In the new unit added in 1958 an atmospheric-pressure system is used. This latter process is characterized by a higher ammonia combustion efficiency and lower catalyst consumption. The same process is employed in the "Kima" plant at Aswan and will be adopted in all other plants under construction.

(b) The "Kima" plant at Aswan. Ammonia is synthesised from pure hydrogen produced by the electrolysis of water and pure nitrogen produced by liquid air fractionation. The availability of cheap electric power from the Aswan Hydro-electric Scheme renders this process economic.

(c) The Helwan fertilizer plant will employ coke oven gas from the adjacent coking plant. Investigations were carried out of all possible processes of cracking this gas, thermally or catalytically, under normal or higher pressures, and either alone or mixed with blast furnace gas. Computation, on the basis of local prices of utilities and raw material gases, has swhown that a catalytic partial oxidation process of the coke oven gas alone under a pressure of about 25 atms. using air enriched with oxygen, was the most economic one.

(d) A petrochemical complex project will be implemented before 1965. The raw material is light naphtha which will be steam cracked to produce various petrochemicals as well as synthesis gas which will be used to produce 200,000 tons of calcium nitrate fertilizer (15.5%N).

The construction of the High Dam will allow an extension in the arable land area. This will necessitate the consumption of additional quantities of phosphatic and nitrogen fertilizers over and above the estimated needs of 1965. Since, electrical power will be then abundant and cheap, it is proposed to produce about 46,000 tons of triple superphosphate and 500,000 tons of calcium ammonium nitrate per year in the Aswan area, both projects being based on the utilization of cheap electrical power.

Applied research in the field of fertilizers in the U.A.R. is mainly directed towards economizing on the use of sulphuric acid in industry, since it is made from imported sulphur or pyrite, and at the same time utilizing more by-product HCl. Thus for example, pilot plant experiments are now being carried out on the manufacture of ammonium sulphate by double decomposition between the locally available gypsum and ammonium carbonate. Also we are trying to lower the carbonate content of rock phosphate by using HCl.

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